

Table 3. Number of plants observed at *Spiranthes diluvialis* occurrences in Idaho, 1996-1998. Occurrences are arranged from downstream to upstream. Dashed line means that occurrence wasn't counted that year.

Occurrence Name	Occurrence No.	1996	1997	1998
Annis Island	006	----	35	2,036
Lorenzo Levee	008	----	1	----
Archer Powerline	015	----	145	----
Twin Bridges Island	007	----	160	108
Railroad Island	005	----	9	14
Kelly's Island	001	12	22	30
Mud Creek Bar	009	----	9	32
Rattlesnake Point	002	15	4	23
TNC Island	010	----	9	9
Warm Springs Bottom	003	173	301	80
Lufkin Bottom	011	----	61	96
Gormer Canyon #5	012	----	10	0
Gormer Canyon #4	013	----	10	11
Gormer Canyon #3	021	----	----	8
Pine Creek #5	014	----	6	14
Pine Creek #3 & #4	016	----	18	113
Lower Conant Valley	017	----	127	0
Upper Conant Valley	018	----	61	15
Lower Swan Valley	019	----	1	8
Falls Campground	004	1	14	5
Squaw Creek Islands	020	----	168	2

- ▶ 1997 - USFWS personnel sent samples from Archer Powerline (015) to the University of Colorado for confirmation through genetic analysis.
- ▶ 1998 - A systematic, range-wide analysis of the genetic structure of Ute ladies tresses is being coordinated by Gerry Steinauer, Nebraska Natural Heritage Program. Laboratory analysis will continue to be conducted by Anna Arft at the University of Colorado. Gerry identified a collector in every state who would collect sample leaf tips from ten plants at four populations in each state. I was the Idaho collector and attempted to spread the four sample sites over the range of occupied river corridor. Unfortunately, the highest collection site was at Pine Creek #3 & #4 (016), ca. 9.5 river miles below the uppermost populations. All populations along the upper stretch were either too small (<10 plants) or did not appear above ground this year. The other three samples were from the lowest occurrence at Annis Island (006), as well as two more in the center of its distribution, Kelly's Island (001) and Lufkin Bottom (011).

Reproductive biology: No change from 1997 status report.

Competition: Two exotic, sod-forming grasses, *Agrostis stolonifera* and *Poa pratensis*, dominate a majority of Ute ladies tresses habitat in Idaho. The implications of this for possible compositional and structural changes in Ute ladies tresses habitat are discussed in the Habitat section. Its affect on ladies tresses population density, demography, or viability is unknown. If, however, the scenario worked out by Gremmen et al. (1998) is analogous to the Snake River, the impact could have been large. Unfortunately, we'll never know for sure because no pre-invasion data exist.

Herbivory: Livestock grazing was a significant management issue in 1997 (see Moseley 1998a for a description of the problem). The effect of cattle grazing on inventory results is well-illustrated at Annis Island (006). Although the season-of-use for this allotment is usually in the early season (May-June), in 1997 the BLM allowed late-season grazing because of early-season access problems associated with the flood. During our inventory in August 1997, we found only 35 plants in the heavily grazed redtop turf. In 1998, grazing was back to its normal early season of use. During our inventories in early September 1998, we found vigorous regrowth of all species in the redtop habitats, including the discovery of over 2,000 Ute ladies tresses individuals.

The biological effects of grazing on Ute ladies tresses viability and plant succession in its habitat is not well understood. Annis Island has been grazed for many years and it still supports the largest population known in Idaho by far. The other interesting aspect of the Annis Island situation is that most of the populations are outside the levee system and no longer experience the normal erosion and deposition that occurs with the larger floods. These processes are probably responsible, at least in part, for maintaining open shrub habitat elsewhere along the Snake River. Grazing may actually be a surrogate for natural flooding by reducing shrub density on Annis Island. Another important aspect of cattle herbivory that is not well understood is its interaction with the cover and vigor of exotic turf-forming grasses (redtop and Kentucky bluegrass) that

dominate much of Ute ladies tresses in Idaho.

Land ownership and management responsibility: See Table 1 for land ownership and management responsibilities for the Idaho occurrences. Fifteen of the 21 occurrences are entirely or partially on public land managed by the BLM. Four occurrences, including the new one discovered in 1998, occur entirely on the Targhee National Forest. Two occurrences occur entirely on private land below Heise and the upstream-most occurrence at Squaw Creek Islands (020) is partially on private land. Madison County and the BLM each manage populations within the Twin Bridges Island (007) occurrence.

Land use and possible threats: As documented in last year's report (Moseley 1998a), alteration of the flow regime resulting from the operation of Palisades Dam is the single biggest long-term threat facing the species in Idaho. Regarding short-term, localized land use impacts and possible threats, nearly every occurrence has human activity taking place in or around them, either direct use or through cattle grazing (Table 4). It is not known, however, the degree to which these pose a threat to persistence and viability of Ute ladies tresses populations.

Livestock grazing was the biggest management issue during 1997. Over the last year, grazing management has changed significantly on nearly all grazed occurrences, as follows:

- ▶ Small exclosures were used to prevent cattle from taking Ute ladies tresses plants at several occurrences in late 1997, mostly as an interim measure until a longer-term solution could be found. The small exclosure at Falls Campground (004), however, appears to have turned into a permanent solution, even though only a small area occupied by plants in 1997 was caged. Habitat known to be occupied in 1996 and much potential habitat remains unprotected.
- ▶ Cattle grazing was eliminated from the Rattlesnake Point (002) occurrence by the Forest Service through construction of fences and a cattleguard.
- ▶ Trespass grazing at Kelly's Island (001) was eliminated.
- ▶ There was an attempt by the Forest Service to implement early season grazing on Warm Springs Bottom (003), but cattle remained on the site into August 1998. Herbivory was observed on Ute ladies tresses plants.
- ▶ Livestock grazing administered by the BLM occurs in three allotments, affecting four Ute ladies tresses occurrences:

5-Ways Allotment [Pine Creek #5 (014) and Pine Creek #3 & #4 (016)] - has been early-season grazing since about 1987, which followed two years of nonuse. It was also in nonuse from about 1991 to 1996. During 1997, the allotment was grazed, but the June flood prevented livestock from grazing the floodplain of the Snake River (and Ute ladies tresses habitat).

Table 4. Known activities and impacts observed in 1998 at *Spiranthes diluvialis* occurrences in Idaho. Occurrences are arranged from downstream to upstream.

Occurrence Name	Occ. No.	Human Activities
Annis Island	006	Cottonwood Grazing Allotment (BLM). Season of use changed to spring (out by end of June).
Lorenzo Levee	008	Not visited this year.
Archer Powerline	015	Not visited this year.
Twin Bridges Island	007	County campground and boat ramp being reconstructed. County and FEMA will protect one population that occurs in project area.
Railroad Island	005	Tressel Grazing Allotment (BLM). No change from 1997.
Kelly's Island	001	Heavily trampled habitat by humans in 1997 & 1998. Problem with trespass cattle grazing solved. No impacts seen associated with being adjacent to BLM fee campground.
Mud Creek Bar	009	Trespass cattle grazing has been controlled. Intermittent outfitter camp, lots of bank fishing, some dispersed camping, but none appears to be impacting populations.
Rattlesnake Point	002	No cows anymore, due to new fences and a cattleguard.
TNC Island	010	Dispersed camping at upstream end; some trampling of habitat. Outfitter camp (located mid-island) was permitted in 1998.
Warm Springs Bottom	003	Targhee NF grazing allotment, grazed through late August. ATV use appears to have been eliminated by construction of bigger barriers. Popular fishing area but no impacts observed.
Lufkin Bottom	011	Same as 1997. Designated river camping area with some trampling in vicinity of plants.
Gormer Canyon #5	012	Spotted knapweed common immediately above upper edge of habitat. No human use seen.
Gormer Canyon #4	013	No change. River camp site nearby, but population isolated from impacts.
Gormer Canyon #3	021	Near lightly use designated river camp. Habitat undisturbed.
Pine Creek #5	014	Designated river camping area. 5-Ways Grazing Allotment (BLM); cattle off by mid-June. No impacts from either activity observed.

Pine Creek #3 & #4	016	Designated river camping area. 5-Ways Grazing Allotment (BLM); cattle off by mid-June. No impacts from either activity observed.
Lower Conant Valley	017	Undisturbed.
Upper Conant Valley	018	Undisturbed.
Lower Swan Valley	019	Undisturbed.
Falls Campground	004	Targhee NF grazing allotment with cage around known cluster of plants. Recreational impacts from campground appear minimal.
Squaw Creek Islands	020	No change to the undisturbed state of the populations discovered in 1997. The 1998 population is near dispersed camp site and habitat appears to receive some recreational trailing.

Trestle Allotment [Railroad Island (005)] - has been early-season and late fall grazing since 1991. In 1997, the adjacent Lowder Slough Allotment was added to the Trestle Allotment to allow cattle an alternate pasture use in the fall.

Cottonwood Allotment [Annis Island (006)] - has been early-season cattle grazing since 1991. In 1997, the BLM allowed the lessees to graze in the late summer because livestock could not access the floodplain during the June flood. Ten horses graze the allotment until mid-August.

With funding from the Federal Emergency Management Agency (FEMA), Madison County is reconstructing and relocating the boat ramp and campground on Twin Bridges Island. Only one small population of occurrence 007 is in the project area. It occurs in a roadside ditch between the old boat ramp and the picnic ground. Madison County and FEMA have agreed to erect a barrier between the population and the road to protect it from disturbance (Moseley 1998c).

ASSESSMENT AND RECOMMENDATIONS

General assessment of vigor, trends, and status: My assessment of the Idaho populations is unchanged from last year, that is, all Idaho populations have existing and potential threats and are vulnerable. Flow regime alteration by Palisades Dam represents the most significant long-term threat to species viability in the Snake River metapopulation, while cattle grazing represents the most significant short-term threat. Management actions implemented by the BLM and Forest Service in 1997 and 1998, however, have greatly reduced the threat of cattle grazing.

Recommendation to the U.S. Fish and Wildlife Service: While the Idaho status information summarized in this report is a necessary component, it does not provide sufficient scope or information for making rangewide status decisions. As with last year's report (Moseley 1998a), this status survey report should be considered an interim summary.

Recommendations to the other federal agencies: The USFWS will work with the BLM and Forest Service on management guidelines for Ute ladies tresses populations on federal land. The Forest Service should implement an early season of use on the cattle allotment that encompasses Warm Springs Bottom, closing the allotment to grazing after the end of June (see section on land use and possible threats).

Recommendation to the Heritage Network: No change from last year. The current conservation rank for Ute ladies tresses, "globally imperiled" or G2, is outdated and should be changed to the more appropriate designation of "rare or uncommon, but not imperiled" or G3, which typically is given to species with 21 to 100 occurrences (Master 1991). The Utah Natural Heritage Program has lead responsibility for the global conservation rank and has initiated a review with this in mind (B. Franklin, personal communication, 1998).

Recommendations regarding present or anticipated activities: The Snake River Basin Office of the USFWS has prepared Section 7 consultation guidelines for Idaho, the most recent being dated February 4, 1998 (U.S. Fish and Wildlife Service 1998). They will be updated annually or as needed. These guidelines characterize potential habitat and outline survey and conservation protocols.

REQUEST TO BOTANISTS AND SURVEYORS!

As I mentioned in a previous section, the CDC compiled all known Ute ladies tresses survey routes for 1996 and 1997. The routes are mapped on 1:100,000-scale maps, identified by surveyor and year. Copies are available upon request from the CDC office in Boise. We plan to do the same thing in 1998. If you conducted any surveys, please send me the information and share it with the world. The minimum information needed is: (1) area surveyed (mapped on ca. 1:100,000-scale maps); (2) surveyor; and (3) date. This information will be compiled throughout the winter and distributed in early spring.

CONSERVATION WORK FOR 1999

The three actions recommended last year (Moseley 1998a) were all accomplished during 1998: 1) a resurvey of suitable-appearing, but unoccupied habitat to determine if plants were missed in 1997 due to prolonged dormancy and/or phenological timing; 2) monitor population levels of known populations and compare with 1996 and 1997 data to determine variability of observable plant numbers; and 3) finish the intensive survey of the remaining segment of the Snake River corridor from the Henry's Fork confluence to Market Lake.

In addition to the nearly 600 miles surveyed in 1997 (CDC 1998; Moseley 1998a), many hundreds more miles were surveyed in Idaho during 1998 (to be documented in a later report). The South Fork of the Snake River remains the only known location for Ute ladies tresses in the state. Aside from project clearances, it appears that additional systematic surveys for Ute ladies tresses in eastern and east-central Idaho are not warranted. I recommend, therefore, that conservation activity be focused on the 49-mile segment of the Snake River known to be occupied habitat. Funding has been secured by the CDC from the BLM and Forest Service to carry out the following proposed work:

1. Continue to monitor population levels and habitat conditions of all known populations and compare with 1996 - 1998 data. Compile 1999 population and habitat data into the centralized data bases at the CDC. This will provide land managers with an understanding of annual variability of observable population levels. Annual monitoring of habitat conditions is important to quickly determine if management regimes or other human disturbances are adversely affecting habitat quality and, potentially, population viability.
2. The Fall Creek Travertine Springs areas is ecologically unique and contains potential habitat for Ute ladies tresses. It is also only a few miles from the Snake River corridor. We will conduct a survey for Ute ladies tresses, sample plant communities in the area, characterize the physical and ecological processes maintaining those communities, as well as record observations on succession and management implications. These data will be entered into the CDC's conservation site and community data bases and compared to ecologically similar sites elsewhere in Idaho.
3. As mentioned previously, there are both long- and short-term threats affecting nearly all Ute ladies tresses in Idaho. River flow alteration by Palisades Dam represents the most significant long-term threat, while direct human use (recreation) and cattle grazing are having short-term impacts to its habitat. In collaboration with researchers from the University of Montana, we plan to gain a greater understanding of primary successional pathways in ladies tresses habitat that will help land and river managers maintain viable populations of Ute ladies tresses. This work will build on past (Merigliano 1996) and ongoing studies of the relationship between fluvial geomorphology, riparian community ecology, and river management. It will also build upon the preliminary ecological data collected this year and the successional hypothesis developed from them (discussed in the Habitat section).

Primary succession is the sequential development of plant communities on newly created habitat. Along the Snake River, this begins with new substrate deposition by a flood. This has implications for river management because it appears that there is no natural Ute ladies tresses habitat younger than Palisades Dam (Moseley 199a). Another possible effect of damming on primary succession is the persistence of some physical site factor on new islands that limits Ute ladies tresses. An understanding of primary succession in Ute ladies tresses habitat will also allow us to better predict the consequences of human disturbance. Secondary succession is the development of communities following interruption by disturbance to the primary successional sequence. In Ute ladies tresses habitat along the Snake, this results largely from cattle grazing

and, to a minor extent, recreational trampling. This is important information for the BLM and Forest Service, who manage most of the recreation and cattle grazing in ladies tresses habitat along the river (see Herbivory section).

The ultimate goal is to relate flood plain dynamics and primary succession to long-term conservation of Ute ladies tresses on the Snake River. Below are the general objectives for three related areas: substrate age, primary succession, and flow regime. We will develop a detailed study plan for this work in early 1999.

A. Determine the age of the alluvial substrate supporting occupied Ute ladies tresses habitat. This will be inferred from the flood plain mapping conducted by Merigliano (1996) above Heise, supplemented with additional air photo interpretation below Heise and measurements directly from ladies tresses habitat using decay rates for an isotope of lead. We are currently testing the applicability of using Pb^{210} to age substrates in herbaceous communities. Samples collected during Fall 1998 were sent to a laboratory in Ontario, Canada for analysis.

B. Model development of plant communities along the primary successional gradient. It appears that we can use a combination of two different techniques to model this chronological sequence: (1) use time-series analysis of a site, that is, observed changes over time in Ute ladies tresses habitat, and (2) infer the chrono-sequence from plots of different successional ages. The model will include estimates of the rate of development along the primary successional pathways and the compositional and structural characteristics of these changes, including possibly the invasion of exotic turf-forming grasses.

C. Determine the elevation Ute ladies tresses habitat on the flood plain and relate river flows. Related to this, we will characterize flow regime and depositional events responsible for creating new habitat and destroying old habitat. Ultimately, we will also try and answer the question of whether the flow regime predicted to restore cottonwood forests (Merigliano 1996) will suffice to maintain Ute ladies tresses habitat.

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APPENDIX 1

Spiranthes diluvialis habitat plot data.

Values in the matrix are cover class codes, which are defined in the Habitat section.

	<i>Equisetum variegatum</i>						<i>Salix exigua/ Agrostis stolonifera</i>			<i>Elaeagnus commutata/ Agrostis stolonifera</i>				
	003C	003B	011A	006A	005A	007A	002B	003A	020A	010A	002A	017A	016A	006B
WOODY SPECIES														
<i>Betula occidentalis</i>				1								1	1	
<i>Elaeagnus commutata</i>										1	1	10	10	3
<i>Populus angustifolia</i>	1		3			3	1	3	1			1		1
<i>Rosa woodsii</i>											1			
<i>Salix bebbiana</i>								3						
<i>Salix exigua</i>		1				10	3	10	10					
<i>Salix lutea</i>	1							3						
GRAMINOIDS														
* <i>Agrostis stolonifera</i>	3	3	20	3	40	50	90	50	70	60	98	50	40	40
<i>Calamagrostis neglecta</i>									1	10				
<i>Carex lanuginosa</i>		1	10	3	10	3	3	1	1			3		20
<i>Carex nebraskensis</i>				3	1								1	
<i>Carex sp.</i>								1						
<i>Eleocharis palustris</i>			1		20			1						
* <i>Festuca arundinacea</i>										10			3	
<i>Juncus balticus</i>			1	3				1				1	3	1
<i>Juncus ensifolius</i>		1	1	3	3	1								1
<i>Juncus longistylis</i>			1	1										
<i>Juncus tenuis</i>		1		1				1						1

	003C	003B	011A	006A	005A	007A	002B	003A	020A	010A	002A	017A	016A	006B
<i>Muhlenbergia asperifolia</i>						1				20				10
<i>Muhlenbergia richardsonis</i>				30			1		3			1	1	3
<i>Phalaris arundinacea</i>								3						
* <i>Phleum pratense</i>									1			1		
* <i>Poa palustris</i>								1						
* <i>Poa pratensis</i>		1					3	60	40	40	20	60	40	10
<i>Scirpus pungens</i>													1	
FORBS & PTERIDOPHYTES														
<i>Aster ascendens</i>					3	1	3	1	3	10				3
<i>Aster hesperius</i>		3	10								3		3	
<i>Cicuta douglasii</i>			1											
* <i>Cirsium vulgare</i>								1			1			
<i>Clematis ligusticifolia</i>														3
<i>Conyza canadensis</i>						1								
<i>Epilobium ciliatum</i>						1								
<i>Equisetum arvense</i>				1							1			
<i>Equisetum laevigatum</i>			1			1	1	1	3	3	1	1	10	10
<i>Equisetum variegatum</i>	60	80	50	40	30	80	3			3	1			1
<i>Euthamia occidentalis</i>					10			3						
<i>Fragaria virginiana</i>												3		
<i>Glycyrrhiza lepidota</i>			3	10							10	10		1

	003C	003B	011A	006A	005A	007A	002B	003A	020A	010A	002A	017A	016A	006B
<i>Habenaria hyperborea</i>												1		
* <i>Medicago lupulina</i>													3	
<i>Mentha arvensis</i>		3	3		10	1	1	1					1	
* <i>Myosotis scorpioides</i>		10	1				1	3				1		
* <i>Plantago major</i>			1	10	1		3						1	3
<i>Potentilla anserina</i>							1							
<i>Prunella vulgaris</i>		3		3			1		3	1				
<i>Ranunculus cymbalaria</i>		1	1	1		3			1					
* <i>Rumex crispus</i>								1						
<i>Smilacina stellata</i>										1				
<i>Solidago missouriensis</i>	1	1						3	1			3		
* <i>Sonchus arvensis</i>		10	1											
<i>Spiranthes diluvialis</i>		1		1		1							1	
* <i>Taraxacum officinale</i>		1		3	10	1	1				1		1	1
* <i>Trifolium fragiferum</i>				3	10	3				1				
* <i>Trifolium repens</i>			1	3			1		1		1		1	
<i>Viola sp.</i>		1	1	3		1			1	1		3	1	
unknown forbs			10	1									1	1
TOTAL SPECIES	5	17	20	21	12	17	16	21	15	13	12	16	19	18

	003C	003B	011A	006A	005A	007A	002B	003A	020A	010A	002A	017A	016A	006B
LIFE FORM DATA														
Woody Cover / Mean Ht.	1/0.5	1/1.0	3/0.2	1/0.1	0/0	10/1.0	3/2.0	10/1.2	10/1.5	1/1.0	1/1.2	10/1.0	10/1.5	3/2.5
Graminoid Cover / Mean Ht.	3/0.4	3/0.3	30/0.3	40/0.1	70/0.7	50/0.9	98/0.9	98/0.4	98/1.0	98/0.8	98/1.5	98/0.2	80/0.5	80/0.3
Forb Cover / Mean Ht.	60/0.1	98/0.1	70/0.2	80/0.1	70/0.2	90/0.2	10/0.2	10/0.1	10/0.1	10/0.2	10/0.1	20/0.1	20/0.1	20/0.1
GROUND COVER														
Soil	70	10	3	1	50	1	20	0	0	10	30	0	3	1
Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rock	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Litter	1	3	40	0	10	1	10	80	60	80	20	80	50	60
Wood	1	0	1	0	3	1	0	0	0	0	0	1	1	0
Moss	0	10	50	10	0	60	0	1	40	1	0	3	3	0
Basal Vegetation	30	70	10	90	40	40	70	20	10	10	50	10	40	40



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